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10/516,324

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Thorsten Scheibel

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ALEXANDRIA, VA 22314

EXAMINER

LAZORCIK, JASON L

ART UNIT

PAPER NUMBER

1791

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DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                                      |  |  |
|------------------------------|--------------------------------------|--|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/516,324 | <b>Applicant(s)</b><br>SCHEIBEL ET AL. |  |
|                              | <b>Examiner</b><br>JASON L. LAZORCIK | <b>Art Unit</b><br>1791                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 February 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 14-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 14-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**Claims 14-18, 21-22, 25-26, and 28** are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Cagliostro (US 4,824,711).

Cagliostro teaches a method for producing a honeycomb shaped carbon based structure including a CVI and/or CVD structural reinforcement procedure. Specifically with respect to the pending claims, the reference teaches

1. Obtaining a resin impregnated fabric comprising organic and/or organic fibers in the form of a honeycomb shaped structure (Column 2, line 42 to Column 3, line 14). The preferred fabric may comprise Aramid paper, phenolic resin fibers, or “any number of suitable reactive organic polymers which can be woven” (Column 4, lines 43-60) [**Claims 15, 25, 26**]
2. Pyrolyzing the resin impregnated structure in the temperature range of 700-1000°C (Column 2, lines 11-14) [**Claims 21, 22**]
3. Transferring the pyrolyzed body to a reactor wherein a silicon carbide material is precipitated from the gas phase upon the pyrolyzed base body thereby “stabilizing and/or compressing” said base body (Column 4, line 61 to column 5, line 20, and Column 5, lines 21-34) [**Claims 16, 17, 18**]. It is here understood that the disclosed deposition of trichloromethylsilane and subsequent thermal treatment to produce silicon carbide implicitly reads upon the claimed “siliconizing” step of the base body [**Claim 28**]

4. The "stabilized" base body is then optionally subject to a secondary pyrolysis step (Column 3, lines 3-6) and further strengthening/finishing operations (Column 8, lines 18-25)

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

**Claims 19, 20, 23, 24** are rejected under 35 U.S.C. 103(a) as being unpatentable over Cagliostro (US 4,824,711) in view of Luhleich (US 4,293,512).

As set forth in the above rejection under 35 U.S.C. 102(b) the Cagliostro reference teaches essentially every element of Applicants claimed invention with the following noted exceptions:

1. The reference is silent regarding the claimed step of stabilizing the pyrolyzed body by application of a ceramic slip followed by conversion of said slip to SiC.
2. The reference is silent regarding a positive step of heating the base body to a temperature range between 1700°C and 3100°C.

Luhleich teaches (see abstract) a method for providing a protective carbide layer on a carbon based substrate. Specifically, the reference teaches that the substrate may be directly dipped into molten silicon. The reference alternately teaches that a paste or ceramic “slip” may be applied to the exterior of the body followed by rapid heating to a temperature in the range of 1550°C to 1800°C (Column 2, lines 55-58). Luhleich teaches that application of the exterior protective carbide coating in accordance with the disclosure provide increased resistance to corrosive effects at high temperatures” (Column 1, lines 14-17).

Further, one having no more than an ordinary level of skill in the art at the time of the invention would recognize the Luhleich teachings as an analogous and closely related procedure to the CVI/CVD process set forth by Cagliostro. In view of the foregoing, it would present little more than a trivial extension over the prior art of record to combine the slip or molten silicon immersion techniques set forth by Luhleich with the process set forth by Cagliostro. Such a modification would have been obvious to one of ordinary skill seeking to provide the carbon substrate with “increased resistance to corrosive effects at high temperatures” as taught by Luhleich.

**Claims 14-18, and 21- 28** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bickerdike et al (US 3,233,014) in view of Merz (US 4,617,072).

Bickerdike teaches a method for forming a carbon article comprising;

- 1) Obtaining a resin impregnated base body (Column 2, line 68 to Column 3, line 7) comprising a random mass, spun, or woven mass of carbon based fibers (Col. 2, lines 15-18) [**Claim 25**] or other “cellulosic fibers” (col. 5, line 44) [**Claim 26**],
- 2) heating said base body to a temperature up to approximately 1000°C (col. 3, line 59) [**Claims 21, 22**] to pyrolyze the base body.
- 3) depositing or “precipitating” a carbon compound from the gaseous phase by CVI or CVD upon the pyrolyzed base body thereby “stabilizing and/or compressing the pyrolyzed base body” (Col. 1, lines 58-61) [**Claims 16, 17,18**], and optionally subjecting the stabilized body to a graphitizing step in an approximate temperature range of 2000 to 2800°C (col1., line 72 to col. 2, line 2; col. 2, lines 28-31) [**Claims 23, 24**],
- 4) The stabilized and/or compressed body is subsequently coated or impregnated with a carbon containing resin and pyrolyzed to achieve a carbon body of desired porosity (col. 2, lines 37-43). The reference

notes that either or both of the vapor or resin coating steps may be repeated to achieve a desired level of impermeability (col. 1, lines 40-44) [**Claim 27**].

While the Bickerdike reference teaches the formation of a reinforced carbonized carbon substrate, said reference is silent regarding the particularly claimed shape of the substrate, namely that of a honeycomb, and the claimed steps directed to forming a silicon carbide layer on the substrate. Specifically, the reference is silent regarding;

- 1) the use of a “honeycomb-shaped” base body as required in claim 14
- 2) the use of an “aramid paper” as requisite in claim 15
- 3) the siliconization step of claim 28

With the foregoing in mind, the reference to Merz (US 4,617,072) teaches a very closely related method for forming a carbon substrate and subsequently treating said substrate to form a SiC reinforcing layer upon said substrate. Specifically with reference to figures 1 and 3, Merz teaches a carbon based substrate which is formed into a generally honeycomb shaped structure. Further, it is the Examiners position that any subtle differences between the shape of the prior art carbon bodies and that claimed by Applicant would have been obvious to one of ordinary skill in the arts.

Merz specifically teaches that the structure may be formed of a resin impregnated thermoplastic, paper, fleece or textile (col. 4, lines 14-26). And, absent any compelling evidence to the contrary, it is the Examiners position that the use of an Aramid paper [**Claim 15**] to fabricate the carbon body would have presented a merely

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trivial extension over the prior art of record for one of ordinary skill in the art at the time of the invention particularly where Applicant admits such materials were known and commercially available (See specification pg 3, lines 18-21).

The reference next instructs that the base substrate is first pyrolyzed or carbonized (col. 2, lines 64-67). This pyrolyzed body is subsequently stabilized, much like the Bickerdike method, by coating with a carbon based resin and subsequently pyrolyzing said resin (col. 3, lines 4-11). This reinforced carbon body is coated with a silicon layer by deposition from the vapor phase and subsequently siliconized [**Claim 28**] at elevated temperature to form a SiC layer upon the base carbon substrate. Merz teaches that a SiC coated carbon substrate of the type disclosed provides a greater durability when exposed to high thermal loads (Col. 2, lines 24-46). It follows that one of ordinary skill in the arts would have been motivated to apply the outer silicon carbide coating as instructed by Mertz upon the Bickerdike carbon body in an effort to enhance the high temperature durability of said body.

**Claims 19, 20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bickerdike et al (US 3,233,014) and Merz (US 4,617,072) and further in view of Luhleich (US 4,293,512).

As set forth in the above rejection under 35 U.S.C. 103(a), the Bickerdike and Merz references teach essentially every element of Applicants claimed invention with the following noted exception:



- 1) The reference is silent regarding the claimed step of stabilizing the pyrolyzed body by application of a ceramic slip followed by conversion of said slip to SiC.

Luhleich teaches (see abstract) a method for providing a protective carbide layer on a carbon based substrate. Specifically, the reference teaches that the substrate may be directly dipped into molten silicon. The reference alternately teaches that a paste or ceramic “slip” may be applied to the exterior of the body followed by rapid heating to a temperature in the range of 1550°C to 1800°C (Column 2, lines 55-58). Luhleich teaches that application of the exterior protective carbide coating in accordance with the disclosure provide increased resistance to corrosive effects at high temperatures” (Column 1, lines 14-17).

Further, one having no more than an ordinary level of skill in the art at the time of the invention would recognize the Luhleich teachings as an analogous and closely related procedure to the procedures set forth in the Bickerdike and Merz references. In view of the foregoing, it would present little more than a trivial extension over the prior art of record to combine the slip or molten silicon immersion techniques set forth by Luhleich for the vapor silicon deposition set forth by Merz. Such a modification would have been obvious to one of ordinary skill seeking to provide the carbon substrate with “increased resistance to corrosive effects at high temperatures” as taught by Luhleich.

***Response to Arguments***

Applicant's arguments filed February 7, 2008 have been fully considered but they are not persuasive.

With respect to the rejection of claims under Cagliostro et. al., Applicant sets forth the following arguments;

1) Applicant purports a distinction between the claimed paper or fleece base body and the woven polymer fabric utilized in the Cagliostro reference. Specifically applicant argues that paper and fleece are distinguished over the prior art material in that they have a closed structure.

Applicant's argument on this matter is held to be unpersuasive.

First, Applicant has provided no explicit definitions within the specification as originally filed to confirm the alleged structural distinctions between the prior art fabric and the claimed fleece or paper. Rather, one of ordinary skill in the art would recognize each of these terms as relating to woven or non-woven fibrous masses. Further, Applicant has provided no support to the alleged "closed structure" of the claimed materials, and one of ordinary skill in the art would not be reasonably apprised of such a feature on a plain reading of Applicants specification. It follows that since Applicants arguments purporting a distinction between the prior art materials and that of the claimed invention are unsupported by any evidence on the record said allegations are therefore held as unsubstantiated attorney argument.

2) Applicant next argues that there is no disclosure or suggestion in the Cagliostro reference of “performing a coating step prior to the second pyrolysis”.

Again, the Examiner does not agree with Applicants allegations.

Specifically, Applicant appears to direct the instant arguments to the preferred embodiment of the specification wherein Applicant provides for a discrete first coating step to “stabilize and/or compress” the pyrolyzed carbon body followed by a separate and distinct second coating step with a carbon containing solution.

It is noted that such a process requiring two distinct coating steps was not required under the claim language of now cancelled claim 1 and that such a limitation is also not required under claim language of pending claim 13. Specifically, Applicants claim language requires only a step of “stabilizing and or compressing” and a step of “coating the stabilized and/or compressed body”. The Examiner can foresee no reasoning why a single coating step such as is disclosed in the Cagliostro reference, which both stabilizes and coats the base carbon body, would not be properly construed to read upon Applicants claim language.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON L. LAZORCIK whose telephone number is (571)272-2217. The examiner can normally be reached on Monday through Friday 8:30 am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on (571) 272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Steven P. Griffin/  
Supervisory Patent Examiner, Art  
Unit 1791

JLL